

Descriptive Summary of the Changes in Coastal Penobscott Bay, Maine, August 5, 1986, to August 13, 1995

Forested lands dominated the landscape of Penobscott Bay, Maine, with over 4 million acres (approximately 44 percent of the land) covered by evergreen, mixed, and deciduous forests. At over 180,000 acres, forest transformations constituted the greatest change detected by the C-CAP land cover analysis in Penobscott Bay, Maine. These transitions represented a cyclic silviculture process, which involves the harvest and reforestation of predominantly evergreen and mixed forest stands. Silviculture is a major industry in the Penobscott area; as a result it is not common for forests in silviculture to be converted to developed lands.

Evergreen farming is a monoculture farming practice common to the Northeast region of the United States. This process was clearly illustrated by the initial change of evergreen forest to bare land following the clearing of a forest, after which grasses colonized the area, transforming the land cover to grassland. Finally, after the reforestation of seedlings, this grassland started to develop into scrub/shrub, eventually reverting to mature evergreen forest. This process was evidenced through the change of 91,000 acres of evergreen forest to scrub/shrub, 30,000 acres of evergreen forest to grassland, and 15,000 acres of scrub/shrub to evergreen forest.

Mixed forest stands were clear-cut through silviculture practices and follow the same transitional regrowth patterns as evergreen forests. This was evidenced in the data set with over 61,000 acres of mixed forest changing to scrub/shrub, 43,000 acres of mixed forest converting to grassland, and over 51,000 acres of scrub/shrub reverting to mixed forest.

Below are three tables. The first two tables contain a data summary for the time 1 and time 2 images. These images were used to create the change image and their tables include; land cover classes, the number of pixels present in each class, and their corresponding values in acres.

The third table is a complete change matrix for time 1 and time 2 images and includes a smaller, generalized table, which groups similar classes together. Table three compares each class from time 1 to time 2 and illustrates the change that took place between classes. The table presents the total acres for each class, the total percent that each class represents, the total acres that changed, and the percent of change they represent.

Tabular Summary: Penobscott, Maine, August 5, 1986

| | CLASS | PIXELS | ACRES | PERCENT |
|----|--------------------------------|-----------------|----------------|----------------|
| 0 | Background | 0 | 0 | 0.00% |
| 1 | Unclassified | 0 | 0 | 0.00% |
| 2 | High Intensity Developed | 190752 | 42422 | 0.53% |
| 3 | Low Intensity Developed | 493233 | 109692 | 1.36% |
| 4 | Cultivated Land | 179978 | 40026 | 0.50% |
| 5 | Grassland | 2130798 | 473877 | 5.89% |
| 6 | Deciduous Forest | 5203398 | 1157204 | 14.39% |
| 7 | Evergreen Forest | 4033263 | 896973 | 11.16% |
| 8 | Mixed Forest | 8543902 | 1900112 | 23.63% |
| 9 | Scrub/Shrub | 3049664 | 678227 | 8.44% |
| 10 | Palustrine Forested Wetland | 1436496 | 319468 | 3.97% |
| 11 | Palustrine Scrub/Shrub Wetland | 1374916 | 305773 | 3.80% |
| 12 | Palustrine Emergent Wetland | 457764 | 101804 | 1.27% |
| 13 | Estuarine Forested Wetland | 0 | 0 | 0.00% |
| 14 | Estuarine Scrub/Shrub Wetla | 0 | 0 | 0.00% |
| 15 | Estuarine Emergent Wetland | 44065 | 9800 | 0.12% |
| 16 | Unconsolidated Shore | 173874 | 38669 | 0.48% |
| 17 | Bare Land | 54390 | 12096 | 0.15% |
| 18 | Water | 8786638 | 1954095 | 24.30% |
| 19 | Palustrine Aquatic Bed | 0 | 0 | 0.00% |
| 20 | Estuarine Aquatic Bed | 0 | 0 | 0.00% |
| 21 | Tundra | 0 | 0 | 0.00% |
| 22 | Snow/ice | 0 | 0 | 0.00% |
| | TOTALS | 36153131 | 8040237 | 100.00% |

Tabular Summary: Penobscott, Maine, August 13, 1995

| | CLASS | PIXELS | ACRES | PERCENT |
|----|--------------------------------|-----------------|----------------|----------------|
| 0 | Background | 0 | 0 | 0.00% |
| 1 | Unclassified | 0 | 0 | 0.00% |
| 2 | High Intensity Developed | 233495 | 51928 | 0.58% |
| 3 | Low Intensity Developed | 553972 | 123200 | 1.38% |
| 4 | Cultivated Land | 217879 | 48455 | 0.54% |
| 5 | Grassland | 2465987 | 548421 | 6.15% |
| 6 | Deciduous Forest | 5344265 | 1188532 | 13.34% |
| 7 | Evergreen Forest | 3727917 | 829066 | 9.30% |
| 8 | Mixed Forest | 8512028 | 1893023 | 21.24% |
| 9 | Scrub/Shrub | 3416848 | 759886 | 8.53% |
| 10 | Palustrine Forested Wetland | 1437121 | 319607 | 3.59% |
| 11 | Palustrine Scrub/Shrub Wetland | 1434914 | 319116 | 3.58% |
| 12 | Palustrine Emergent Wetland | 468928 | 104287 | 1.17% |
| 13 | Estuarine Forested Wetland | 0 | 0 | 0.00% |
| 14 | Estuarine Scrub/Shrub Wetland | 0 | 0 | 0.00% |
| 15 | Estuarine Emergent Wetland | 72053 | 16024 | 0.18% |
| 16 | Unconsolidated Shore | 229965 | 51143 | 0.57% |
| 17 | Bare Land | 45982 | 10226 | 0.11% |
| 18 | Water | 11915508 | 2649937 | 29.73% |
| 19 | Palustrine Aquatic Bed | 0 | 0 | 0.00% |
| 20 | Estuarine Aquatic Bed | 0 | 0 | 0.00% |
| 21 | Tundra | 0 | 0 | 0.00% |
| 22 | Snow/Ice | 0 | 0 | 0.00% |
| | TOTALS | 40076862 | 8912851 | 100.00% |

Change Matrix and Tabular Summary: Penobscott, Maine from August 5, 1986 to August 13, 1995

| | FROM / TO | High Intensity Developed | Low Intensity Developed | Cultivated Land | Grassland | Deciduous Forest | Evergreen Forest | Mixed Forest | Scrub/Shrub | Palustrine Forested Wetland | Palustrine Scrub/Shrub Wetland | Palustrine Emergent Wetland | Estuarine Forested Wetland | Estuarine Scrub/Shrub Wetland | Estuarine Emergent Wetland | Unconsolidated Shore | Bare Land | Water | Palustrine Aquatic Bed | Estuarine Aquatic Bed | Tundra | Snow/Ice | Total Acres | Changed | | |
|-------------------|--------------------------------|--------------------------|-------------------------|-----------------|-----------|------------------|------------------|--------------|-------------|-----------------------------|--------------------------------|-----------------------------|----------------------------|-------------------------------|----------------------------|----------------------|-----------|-----------|------------------------|-----------------------|---------|----------|-------------|--------------------------------|-------------------------------|------------------------|
| 2 | High Intensity Developed | 42304 | 0 | 0 | 4 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 115 | 1 | 0 | 0 | 0 | 0 | 42427 | High Intensity Developed | | |
| 3 | Low Intensity Developed | 4 | 109674 | 0 | 11 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 109695 | Low Intensity Developed | | |
| 4 | Cultivated Land | 0 | 0 | 39968 | 54 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 40026 | Cultivated Land | | |
| 5 | Grassland | 570 | 430 | 3897 | 437931 | 13834 | 1427 | 6306 | 8229 | 4 | 609 | 42 | 0 | 0 | 4 | 50 | 480 | 54 | 0 | 0 | 0 | 0 | 473868 | Grassland | | |
| 6 | Deciduous Forest | 41 | 74 | 395 | 10182 | 1118910 | 9714 | 7767 | 9707 | 13 | 128 | 28 | 0 | 0 | 1 | 0 | 203 | 32 | 0 | 0 | 0 | 0 | 1157195 | Deciduous Forest | | |
| 7 | Evergreen Forest | 665 | 1934 | 577 | 29711 | 685 | 766500 | 1460 | 91427 | 111 | 2893 | 108 | 0 | 0 | 25 | 3 | 454 | 447 | 0 | 0 | 0 | 0 | 897000 | Evergreen Forest | | |
| 8 | Mixed Forest | 820 | 1254 | 1411 | 43372 | 5746 | 9083 | 1772600 | 61772 | 59 | 2473 | 224 | 0 | 0 | 14 | 0 | 963 | 344 | 0 | 0 | 0 | 0 | 1900136 | Mixed Forest | | |
| 9 | Scrub/Shrub | 450 | 767 | 1257 | 11327 | 22233 | 15388 | 51770 | 573129 | 42 | 1094 | 155 | 0 | 0 | 18 | 104 | 204 | 290 | 0 | 0 | 0 | 0 | 678227 | Scrub/Shrub | | |
| 10 | Palustrine Forested Wetland | 0 | 0 | 3 | 3 | 2 | 38 | 4 | 85 | 314292 | 4563 | 389 | 0 | 0 | 1 | 20 | 12 | 61 | 0 | 0 | 0 | 0 | 319474 | Palustrine Forested Wetland | | |
| 11 | Palustrine Scrub/Shrub Wetland | 0 | 0 | 287 | 11 | 1 | 69 | 40 | 58 | 1628 | 302734 | 170 | 0 | 0 | 14 | 66 | 83 | 617 | 0 | 0 | 0 | 0 | 305777 | Palustrine Scrub/Shrub Wetland | | |
| 12 | Palustrine Emergent Wetland | 0 | 0 | 0 | 0 | 0 | 29 | 10 | 11 | 242 | 419 | 100822 | 0 | 0 | 5 | 40 | 10 | 214 | 0 | 0 | 0 | 0 | 101804 | Palustrine Emergent Wetland | | |
| 13 | Estuarine Forested Wetland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Estuarine Forested Wetland | |
| 14 | Estuarine Scrub/Shrub Wetland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Estuarine Scrub/Shrub Wetland | |
| 15 | Estuarine Emergent Wetland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 9784 | 0 | 4 | 8 | 0 | 0 | 0 | 0 | 9800 | Estuarine Emergent Wetland | | |
| 16 | Unconsolidated Shore | 10 | 9 | 1 | 29 | 8 | 75 | 37 | 93 | 55 | 7 | 32 | 0 | 0 | 50 | 38219 | 15 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | Unconsolidated Shore | |
| 17 | Bare Land | 16 | 3 | 386 | 1587 | 482 | 342 | 586 | 1209 | 51 | 36 | 30 | 0 | 0 | 6 | 73 | 7097 | 193 | 0 | 0 | 0 | 0 | 0 | 0 | 12095 | Bare Land |
| 18 | Water | 8 | 17 | 3 | 78 | 0 | 7 | 2 | 226 | 171 | 133 | 223 | 0 | 0 | 10 | 95 | 8 | 1953060 | 0 | 0 | 0 | 0 | 0 | 0 | 1954043 | Water |
| 19 | Palustrine Aquatic Bed | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Palustrine Aquatic Bed |
| 20 | Estuarine Aquatic Bed | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Estuarine Aquatic Bed |
| 21 | Tundra | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tundra |
| 22 | Snow/Ice | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Snow/Ice |
| Total Acres | | 44,889 | 114,164 | 48,185 | 534,300 | 1,161,901 | 802,672 | 1,840,582 | 745,954 | 316,669 | 315,089 | 102,226 | - | - | 9,932 | 38,671 | 9,653 | 1,955,351 | - | - | - | - | 6087178 | Total Acres | | |
| Percent | | 0.74% | 1.88% | 0.79% | 8.78% | 19.09% | 13.19% | 30.24% | 12.25% | 5.20% | 5.18% | 1.68% | 0.00% | 0.00% | 0.16% | 0.64% | 0.16% | 32.12% | 0.00% | 0.00% | 0.00% | 0.00% | | Percent | | |
| Changed 1985-1995 | | 2,462 | 4,469 | 8,159 | 60,433 | 4,706 | -94,328 | -59,554 | 67,726 | -2,806 | 9,312 | 422 | 0 | 0 | 132 | 1 | -2,442 | 1,308 | 0 | 0 | 0 | 0 | | Total Acres that Changed | | |
| Percent Change | | 5.80% | 4.07% | 20.38% | 12.75% | 0.41% | -10.52% | -3.13% | 9.99% | -0.88% | 3.05% | 0.41% | #DIV/0! | #DIV/0! | 1.35% | 0.00% | -20.19% | 0.07% | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | | Percent Change | | |

| FROM / TO | Developed | Cultivated | Grassland | Forested | Scrub/Shrub | Wetlands | Bare | Water | Total Acres | Changed | |
|-----------------------------|-----------|------------|-----------|-----------|-------------|----------|--------|-----------|-------------|---------|-------------|
| Developed | 151,982 | 1 | 16 | 1 | 3 | 0 | 118 | 1 | 152,122 | 140 | Developed |
| Cultivated | 0 | 39,968 | 54 | 1 | 4 | 0 | 0 | 0 | 40,026 | 59 | Cultivated |
| Grassland | 1,001 | 3,897 | 437,931 | 21,572 | 8,837 | 659 | 530 | 54 | 474,481 | 36,550 | Grassland |
| Forested | 4,788 | 2,385 | 83,269 | 4,006,983 | 173,048 | 6,076 | 1,656 | 884 | 4,279,091 | 272,108 | Forested |
| Scrub/Shrub | 1,218 | 1,544 | 11,337 | 91,170 | 877,015 | 2,027 | 457 | 907 | 985,675 | 108,660 | Scrub/Shrub |
| Wetlands | 1 | 290 | 14 | 192 | 155 | 735,067 | 236 | 900 | 736,856 | 1,788 | Wetlands |
| Bare | 39 | 387 | 1,616 | 1,635 | 1,344 | 267 | 45,404 | 223 | 50,914 | 5,510 | Bare |
| Water | 25 | 3 | 1,587 | 180 | 360 | 538 | 103 | 1,953,060 | 1,955,857 | 2,797 | Water |
| Total Acres | 159,055 | 48,475 | 535,824 | 4,121,734 | 1,060,767 | 744,634 | 48,505 | 1,956,029 | 6,087,178 | 427,611 | Total Acres |
| Percent of Total (Y2/Total) | 2.61% | 0.80% | 8.80% | 67.71% | 17.43% | 12.23% | 0.80% | 32.13% | | 7.02% | |
| Total Change (Y2-Y1) | 6932 | 8449 | 61343 | -157357 | 75092 | 7778 | -2409 | 172 | | 427611 | |
| Percent Change | 4.56% | 21.11% | 12.93% | -3.68% | 7.62% | 1.06% | -4.73% | 0.01% | | 7.02% | |